(12) UK Patent Application (19) GB (11) 2 223 063 (13) A

(43) Date of A publication 28.03.1990

(21) Application No 8822542.0

(22) Date of filing 26.09.1988

(51) INT CL⁴
F03B 13/00 // F03B 7/00 11/00

(52) UK CL (Edition J)
F1S S30
B7V VFB
F1Q Q14
F1T TH1E2 TH2F
U1S S1987 S2081

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(58) Field of search
UK CL (Edition J) F1S, F1T
INT CL⁴ F03B 7/00 11/00 11/02 11/04 11/06 11/08 13/00 13/02 13/04 13/06 13/08 13/10 13/12 13/14 13/16 13/18 13/20 13/22 13/24 13/26 17/00 17/02 17/04 17/06

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(54) Water powered floating electric generator

(57) A floating generator which can be placed in a stream or river and by the action of the flow of water upon paddles 15, drive electric generators 19 to produce electric power for direct transmisssion for domestic use, is releasably tethered by pivoted arms 23, 24, to two anchor pillars 27, 28 which are sunk into the bed of the river or stream. The pillars are linked together by a perforated deflecting screen 31 to divert flotsam away from the rotating paddles. A protective cowl 34 may be provided. The generators 19 may be driven via torque converters and gears 20.

Water Powered Floating Electric Generator.

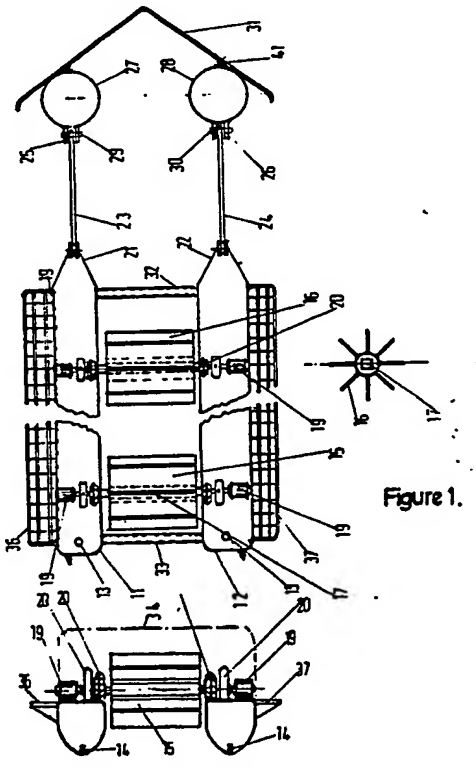

Figure 1.

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Water Powered Floating Electric Generator. Sheet 1 of 4

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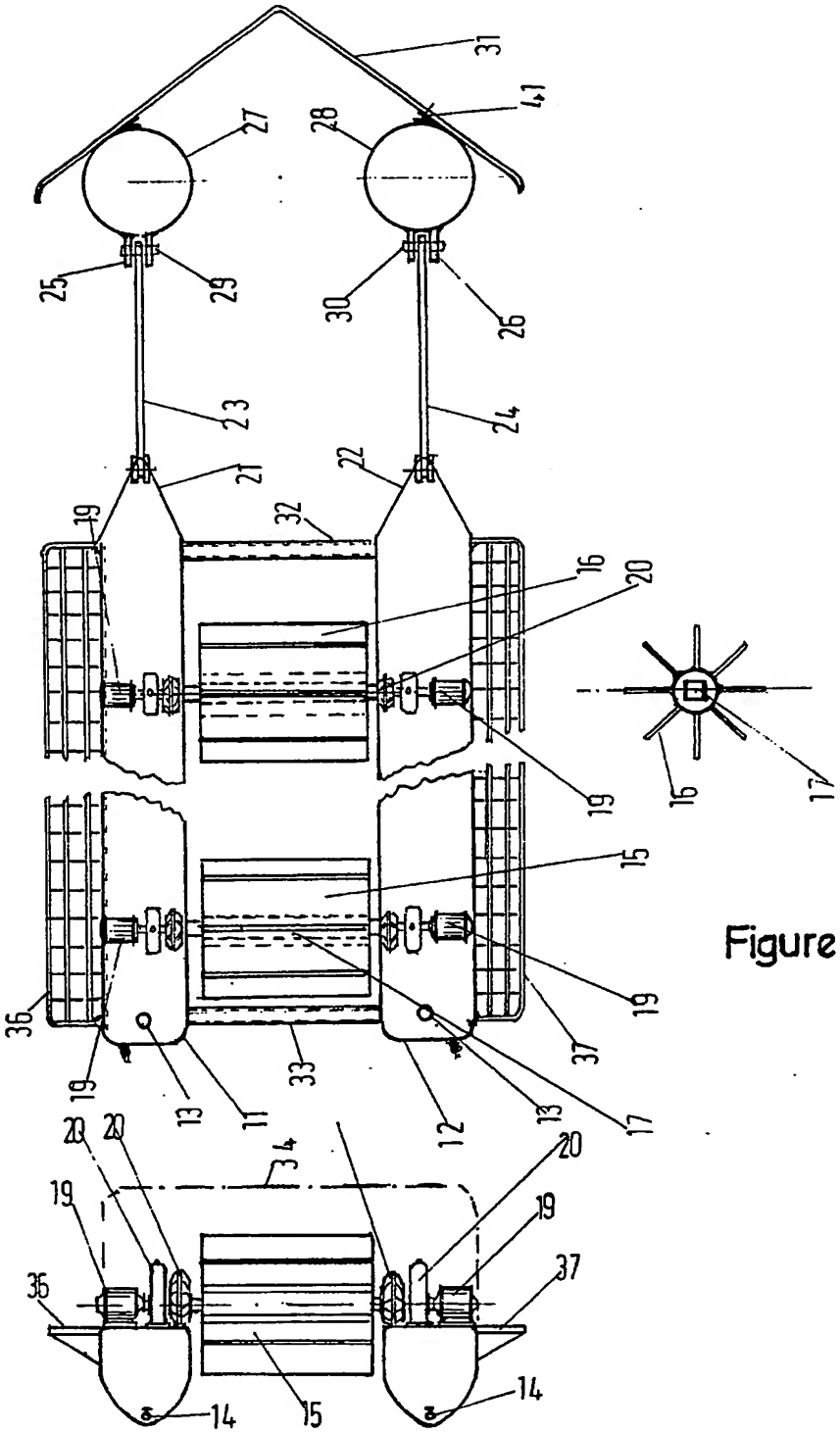
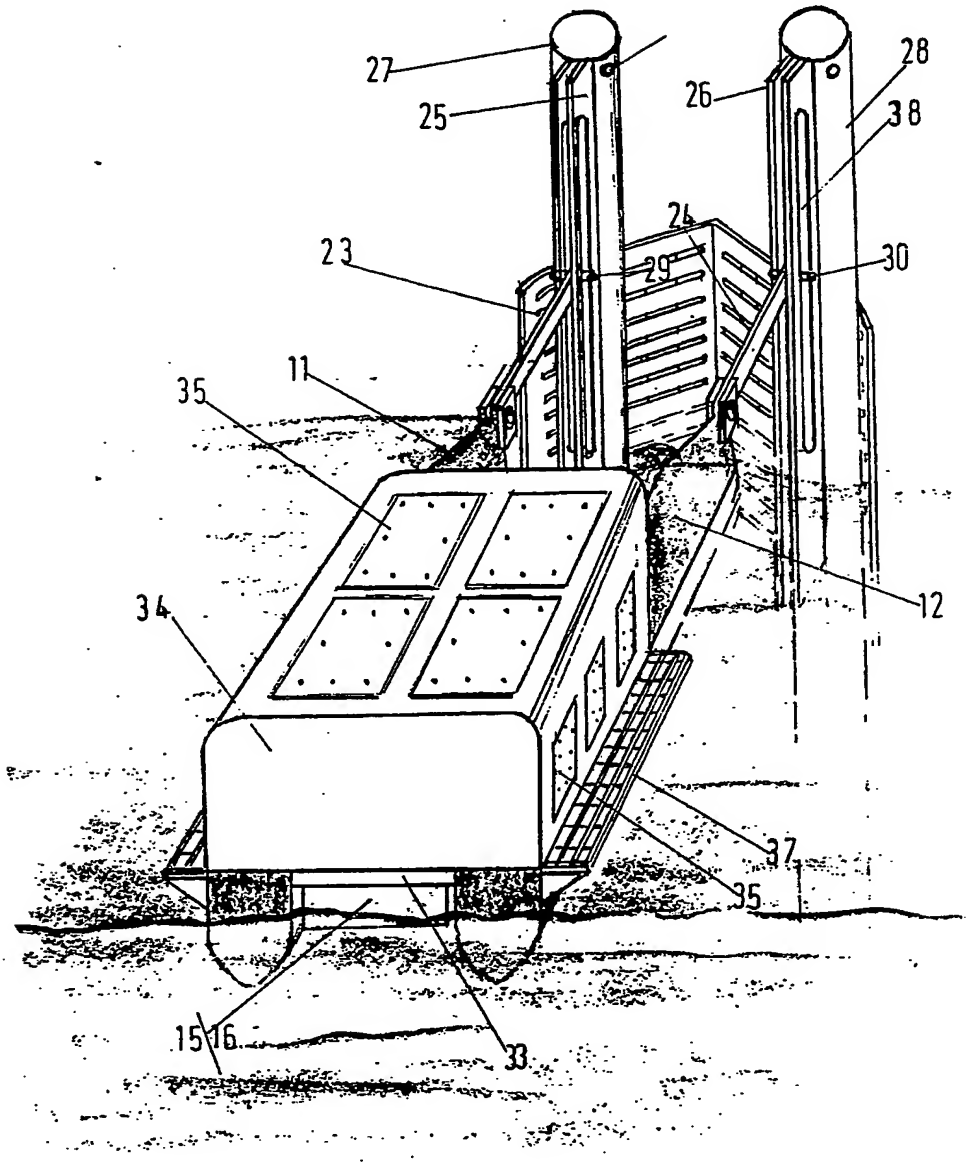


Figure 1.

Water Powered Floating Electric Generator.

Figure 2.



Water Powered Floating Electric Generator.

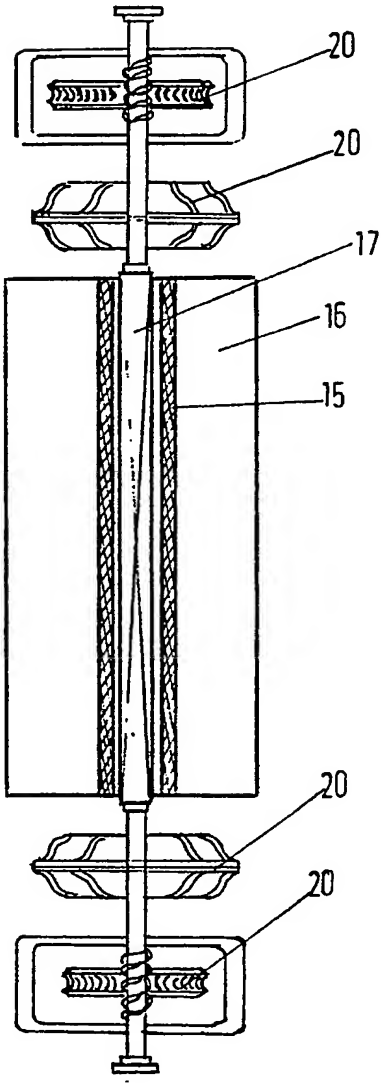


Figure 3.

Water Powered Floating Electric Generator.

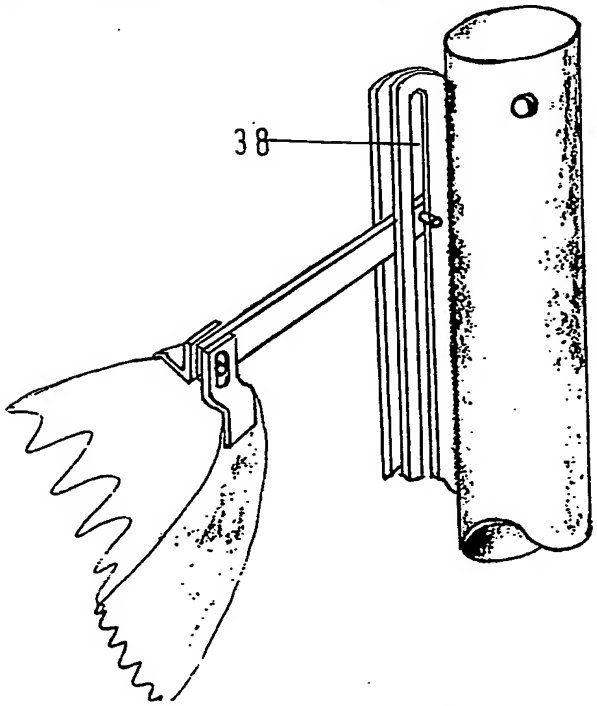


Figure 4

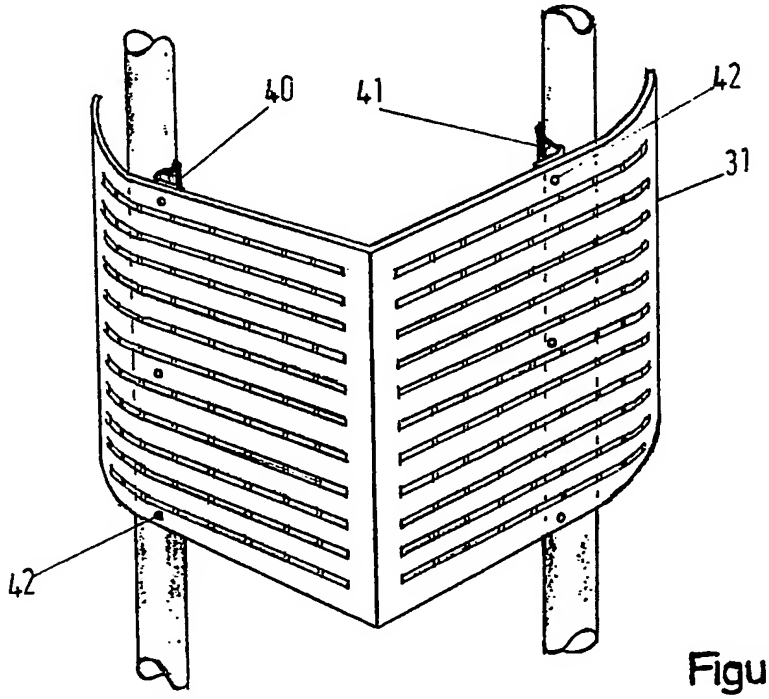


Figure 5

Sheet 1. WATER POWERED FLOATING ELECTRIC GENERATOR. 2223063

The need to find alternative means of generating electric power, has engaged man through the ages. The known sources of primary energy in the form of coal, wind, water, oil and timber have provided many opportunities for man's ingenuity. Energy from harnessing tidal flow, of capturing the energy in the waves of the oceans or of making use of water flow in streams to drive 'under' or overfed water wheels, has been practised extensively.

Making use of compressed air captured in coastal caves or caverns to drive turbines and to use the suction of air from the atmosphere to drive turbines in the reverse direction, is currently practised.

Many attempts to activate paddle wheels by the velocity of water flowing in streams and rivers have been tried and abandoned.

According to the present invention, there is provided two ballast chambers which support a number of electrical generators which themselves are driven by paddles submerged in flowing water or streams, the whole being adequately tethered to two anchored pillars or columns sunk into the bed of the river or stream. A pivoted arm between the columns and the ballast chambers permits oscillation of the chambers due to movement of the water.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows a plan and end view of the floating electric generator.

Sheet 2. WATER POWERED FLOATING ELECTRIC GENERATOR.

Figure 2 is a perspective view with the floating electric generator on and in the water.

Figure 3 illustrates the drive mechanism between the paddle and the generator.

Figure 4 shows how the floating electric generator is connected with the anchor pillars.

Figure 5 illustrates a flotsam deflector.

Referring to the drawing, the floating electric generator 10 consists of two ballast chambers 11 and 12 which have two filler caps 13 and two drain cocks 14 which enable the ballast chambers to be filled or emptied as required. Filling of the chambers with liquid enables the paddles 15 to be lowered deeper into the water to receive a greater volume of water against the surface area of each vane 16 in the paddle 15.

In the preferred embodiment, each paddle has eight vanes 16 but in any other embodiment the number of vanes 16 might be increased or decreased. The paddles 15 are carried on square shaftings 17, the ends of which are machined round to match the bearings 18 in the housings of the generators 19 and the torque converters and gears 20. In the preferred embodiment, six generators 19 are provided but in any other embodiment there could be a greater or lesser number of generators.

Each of the ballast chambers 11 and 12 are converged to a point 21 and 22 at the upstream end to reduce resistance as well as to direct the flowing water to the paddles 15. At each pointed end 21 and 22 of the two ballast chambers 11 and 12 are two pivoted arms 23 and 24 which permit the chambers 11 and 12 to rise and

fall freely as influenced by any motion imparted to the water in which the floating generator 10 is sited. The pivoted attachments for each of the arms 23 and 24 permit the two ballast chambers 11 and 12 to move in a vertical up and down direction but not to move laterally. More specific detail is included in Figure 4.

Similar pivot attachments 25 and 26 are provided at each anchor pillar 27 and 28 but each have the additional feature of being able to adjust to the height of the water insomuch as each anchor pillar attachment is provided with a long elongated slot along which anchor pillar pivot pins 29 and 30 may slide so as to impose no upward thrust on the anchor pillars 27 and 28 to cause them to be 'uprooted' from the bed of the river or stream. Attached to each anchor pillar 27 and 28 is a perforated deflector 31 to protect the paddles 15 from inadvertent damage by driftwood or unwanted flotsam. The deflector 31 is perforated to present as little resistance to water flow as possible, because the pressure from water velocity could impose undue and unwanted thrust to each of the anchor pillars 27 and 28. The perforated deflector 31 extends below the water line sufficiently far enough to prevent flotsam passing beneath its lowest extremity and re-emerging to foul the paddles 15.

The two ballast chambers 11 and 12 are rigidly linked together by two horizontal struts 32 and 33 bonded to the adjacent faces of chambers 11 and 12 at a position above the lowest third of the paddles 15 so as to offer no restriction to the flow of water to said paddles 15.

Similarly, but not shown in the plan view Figure 1, for reasons

of clarity, is a protective cowl 34 which is attached to vertical struts 35 bonded to ballast chambers 11 and 12. The cowl 34 surrounds the paddles 15, torque convertors and gears 20, and generators 19 to prevent inadvertent damage as well as wilful interference. The cowl 34 has appropriately located hatches 35 which may be removed to effect repairs or replacement of any component. Along each outward facing side of each ballast chamber 11 and 12 is an overhang platform 36 and 37 constructed of grating which will provide access to the cowl 34 and each of the repair hatches 35.

In the preferred embodiment the use of reinforced plastics is recommended and only the paddles 15, shaftings 17, torque convertors and gears 20 and the generators 19 are essentially of conventional and traditional design.

The velocity of the water flowing in streams or rivers impart a rotary motion to the paddles, which, through gears 20 will cause a rotation of 1440 revolutions per minute to each of the generators 19. The torque convertors effect regulation to the revolutions to ensure that any increase in the rate of flow in the river or stream would not result in an excessive increase in the number of revolutions per minute of the generators 19.

Referring to Figure 2,the perspective view of the floating electric generator 10 shows the relationship between the level of the water and the vanes 16 of the paddles 15. Depending on the depth of the water in which the floating generator 10 may be anchored and on the extent of rise and fall of any tidal flow or increase from rainfall or decrease from lack of precipitation, the paddles 15 can be submerged to any predetermined depth to

obtain the necessary revolutions for the generators 19. Because the floating generator 10 is enclosed, it can operate unattended and is unlikely to require anything other than routine maintenance.

In the preferred embodiment, six paddles 15 are included, giving an estimated electrical output of 7.5 kw at 50 Hertz and will include a voltage cut-out in the event of power not being required. It is also intended that direct current convertors be included in the electrical circuitry to enable storage batteries to be charged in the event power is not being absorbed at the site to which it is transmitted.

It is not intended in the preferred embodiment that electrical power be transmitted to the National Grid because generators 19 will produce a preferred voltage of 240 at 50 cycles, the acceptable voltage on single phase for domestic use.

It is not the intention of this patent application to define the degree of sophistication designed into the electrical circuitry.

Referring to Figure 3, the paddle 15 with vanes 16 is diagrammatically indicated mounted on square steel shafting 17 the ends of which are machined round to sit in roller or ball bearings within the housings of the torque convertors and gears 20. The torque convertor is in effect a fluid flywheel or a slipping clutch. It transmits the rotary power imparted to the paddle 15 by the velocity in the flow of water in the river or stream. If the velocity of flow is excessive, the fluid flywheel 20 will provide a 'slipping characteristic' and at reduced flow the drive to the generator will be minimal.

It is an embodiment of this invention that the site for the floating electric generator be chosen from long term statistical data which will have recorded the seasonal characteristics of the river or stream volumes and flow velocities.

Figure 4 illustrates the linkage between the floating generators 10 and the anchor pillars 27 and 28 where 36 is the upright brackets from the ballast chambers 11 and 12, and 37 the two fulcrum pins within them. The two floating levers 24 with their two pivot pins 29 and 30 engage in the elongated slots 38 in anchor pivot attachments 25 and 26 indicating how the pivot pins can rise or fall within the slots 38. It is an embodiment of this invention that the pivot pins 29, 30 and 37 would be in stainless steel or bronze to reduce the possibility of corrosion. And similarly, all exposed metal components throughout the entire structure comprising the floating generator 10 would be corrosion proofed by either an epoxy based paint or a plastic film.

Referring to Figure 5, the flotsam deflector 39 is shown attached releasably to the upright anchor pillars 27 and 28. Two brackets 40 and 41 are electrically arc welded to the anchor pillars 27 and 28 at appropriate positions on the upstream side of the said pillars. The flotsam deflector 39 is releasably secured to the two brackets 40 and 41 by six stainless steel bolts 42. The flotsam deflector 39 is constructed in an angular projection towards the upstream direction to fend off floating debris clear of the rotating paddles 15. The flotsam deflector 39 is gridded or slotted to present as little resistance to water flow as possible and to reduce any tendency to vortex action or the

generation of eddy currents. While the preferred shape to which the flotsam deflector 39 is formed is angular, it is not essentially the only embodiment, any other shape is acceptable. Attached to the exterior of each anchor pillar 27 and 28 are two deflector vanes 43 which direct debris from the two ballast chambers 11 and 12. These deflector vanes 43 are perforated to reduce thrust on the said pillars and each is electrically arc welded to the said pillars. Two one-inch diameter holes are provided near the top of the two anchor pillars 27 and 28 to facilitate lifting at any future time following anchorage in a river or stream. These anchor pillars 27 and 28 are pointed at the lower extremity to facilitate driving into the river or stream bed.

While the description provided for the two anchor pillars 27 and 28 is the preferred method of anchorage for the floating generator 10, it is not claimed as the essential or only method of anchorage. The method of anchorage is merely an adjunct to the invention and any appropriate method of releasably securing the floating generator 10 in a river or stream would be acceptable.

CLAIMS.

1. A water powered floating electric generator comprising two ballast chambers which are separated from each other at a specific distance and between which in the intervening space are a number of paddle wheels which are acted upon by the flow of water in a river or stream. The paddle wheels are directly linked with electric generators which produce electric power at 50 Hertz and at low voltage for domestic use. The floating generator is tethered releasably to two anchor pillars sunk into the bed of the river or stream.

2. A water powered floating electric generator as claimed in 1 where means is provided to deflect debris, flotsam and drift-wood from damaging the rotating paddles.

3. A water powered floating electric generator as claimed in 1 and 2 wherein means is provided to protect the moving components from inadvertent or wilful damage yet provide access to the said components for maintenance or replacement.

4. A water powered floating electric generator as claimed in 1, 2 and 3 wherein is provided torque convertors and appropriate gearing to transfer the rotation from the paddles to the generators.

5. A water powered floating electric generator as claimed in 1,2, 3 and 4 wherein is provided means to permit the two ballast chambers to rise and fall freely as affected by water undulations.

6. A water powered floating electric generator substantially

as described herein with reference to Figures 1 - 5 of the accompanying drawing.

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